Package 'Rsymphony'

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Title Symphony in R

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Description An R interface to the SYMPHONY MILP solver (version 5.1.10).

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Depends R (>= 2.6.0)

Enhances slam

URL http://R-Forge.R-project.org/projects/rsymphony, http://www.coin-or.org/SYMPHONY/

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R topics documented:

Rsymphony_solve_LP *COIN-OR SYMPHONY Linear and Mixed Integer Programming Solver*

Description

High level R interface to the COIN-OR SYMPHONY solver for linear as well as mixed integer linear programming problems (MILPs).

Usage

```
Rsymphony_solve_LP(obj, mat, dir, rhs, bounds = NULL, types = NULL,
                   max = FALSE)
```

Arguments

obj	a vector with the objective coefficients
mat	a vector or a matrix of the constraint coefficients
dir	a character vector with the directions of the constraints. Each element must be one of "<", "<=", ">", ">=", "==" or "!=".
rhs	the right hand side of the constraints
bounds	NULL (default) or a list with elements upper and lower containing the indices and corresponding bounds of the objective variables. The default for each variable is a bound between 0 and Inf.
types	a character vector giving the types of the objective variables, with "C", "I", and "B" corresponding to continuous, integer, and binary, respectively, or NULL (default), taken as all-continuous. Recycled as needed.
max	a logical giving the direction of the optimization. TRUE means that the objective is to maximize the objective function, FALSE (default) means to minimize it.

Details

SYMPHONY is an open source solver for solving mixed integer linear programs (MILPs). The current version can be found at https://projects.coin-or.org/SYMPHONY. Package **Rsymphony** uses the C interface of the callable library provided by SYMPHONY, and supplies a high level solver function in R using the low level C interface.

Value

A list containing the optimal solution, with the following components.

solution	the vector of optimal coefficients
objval	the value of the objective function at the optimum
status	an integer with status information about the solution returned: 0 if the optimal solution was found, a non-zero value otherwise.

Author(s)

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References

SYMPHONY development home page (https://projects.coin-or.org/SYMPHONY/wiki).

See Also

lp in package **lpSolve**; Rglpk_solve_LP in package **Rglpk**.

Examples

```
## Simple linear program.
## maximize:   2 x_1 + 4 x_2 + 3 x_3
## subject to: 3 x_1 + 4 x_2 + 2 x_3 <= 60
##             2 x_1 +   x_2 +   x_3 <= 40
##               x_1 + 3 x_2 + 2 x_3 <= 80
##               x_1, x_2, x_3 are non-negative real numbers

obj <- c(2, 4, 3)
mat <- matrix(c(3, 2, 1, 4, 1, 3, 2, 2, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(60, 40, 80)
max <- TRUE

Rsymphony_solve_LP(obj, mat, dir, rhs, max = max)

## Simple mixed integer linear program.
## maximize:    3 x_1 + 1 x_2 + 3 x_3
## subject to: -1 x_1 + 2 x_2 +   x_3 <= 4
##                      4 x_2 - 3 x_3 <= 2
##               x_1 - 3 x_2 + 2 x_3 <= 3
##               x_1, x_3 are non-negative integers
##               x_2 is a non-negative real number

obj <- c(3, 1, 3)
mat <- matrix(c(-1, 0, 1, 2, 4, -3, 1, -3, 2), nrow = 3)
dir <- c("<=", "<=", "<=")
rhs <- c(4, 2, 3)
max <- TRUE
types <- c("I", "C", "I")

Rsymphony_solve_LP(obj, mat, dir, rhs, types = types, max = max)

## Same as before but with bounds replaced by
## -Inf <  x_1 <= 4
##    0 <= x_2 <= 100
##    2 <= x_3 <  Inf

bounds <- list(lower = list(ind = c(1L, 3L), val = c(-Inf, 2)),
```

```
                upper = list(ind = c(1L, 2L), val = c(4, 100)))

Rsymphony_solve_LP(obj, mat, dir, rhs, types = types, max = max,
                   bounds = bounds)
```

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